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ABSTRACT

The relationship was investigated between test scores obtained from the Iowa Tests of Basic Skills (ITBS) and the Iowa Tests of Educational Development (ITED), and the grade point average (GPA) at the high school and college level. The data used were unique in providing a longitudinal comparison of college students' performance with the results of their early elementary achievement test performance. Specifically, the predictive validity of the ITBS and the ITED was investigated. Records of 1,997 graduates of Iowa high schools who entered the University of Iowa as freshmen in the fall of 1977 were analyzed. Zero-order correlations were computed between ITBS composite scores (grades 4, 6, and 8) and: (1) four-year high school GPA; (2) high school percentile rank; and (3) first semester freshman college GPA. Similar correlations were computed using ITED composite scores (grades 9-12) in place of ITBS scores. Separate correlations were also computed for males and females. Results supported the contention that proficiency in basic skills at the elementary and high school levels, as measured by ITBS and ITED, does have a significant relationship to high school and college academic success for both males and females. (RL)

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Relationships of Elementary and Secondary Achievement
Test Scores to Later Academic Success

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ABSTRACT

This study investigated the relationship between test scores obtained from two standardized achievement test batteries (ITBS and ITED) and academic success (grade point average) at the high school and college level. The basic population consisted of approximately 2000 freshmen who entered the University of Iowa in the fall of 1977. The correlations between test scores and grade point averages were similar to those reported for college entrance type tests. Correlations were also computed for males and females separately. The results indicated that the relationships were generally higher for females than for males.

Relationships of Elementary and Secondary Achievement Test Scores to Later Academic Success

Achievement batteries at the elementary and high school level are intended primarily to aid in the evaluation of each school's total program, in the evaluation of pupils' growth and development, and in the determination of the examinee's current level of educational development. Therefore, content validity of such tests is usually considered of primary importance. However, standardized achievement test scores also provide valuable information for making more informed decisions throughout the pupil's school career. Often the results of such tests are used to aid in deciding which elementary pupils should be placed in advanced mathematics classes at the junior high and high school levels or which high school students should be placed in honors sections. The test scores also provide information concerning college potential of individuals so that students may be advised in their course selections in high school. Thus the predictive relationships between standardized achievement tests and the success of students in high school and college is also of interest.

Numerous studies have been conducted to evaluate the abilities of standardized admissions tests such as the American College Tests (ACT) to predict first semester grade point averages in college (Aleamoni et al., 1978; Ferguson et al., 1975; Munday, 1970). Less attention has been given to the ability of standardized achievement test batteries at the high school and elementary school level to predict college success or high school success. Wilson (1974) reported that considering standardized achievement test scores along with the usual predictors such as aptitude tests and school records can make a modest improvement

in the effectiveness of predictions of college academic success. Few investigators (Scannell, 1958) have examined the value of elementary school achievement in predicting academic success in high school or college.

The primary purpose of this investigation was to determine the relationship of academic success in high school and college to standardized achievement test scores from elementary and secondary school. The data used are unique in providing a longitudinal comparison of college students' performance with the results of their early elementary achievement test performance. Specifically, the predictive validity of the Iowa Tests of Educational Development (ITED) and the Iowa Tests of Basic Skills (ITBS) was investigated.

In this investigation the following questions were of interest:

- 1) What is the relationship of ITBS scores obtained in grades 4, 6, and 8, and ITED scores obtained in grades 9, 10, 11, and 12 to later academic achievement in high school?
- 2) What is the relationship of these ITBS scores and ITED scores to later academic achievement in college, and how does this relationship compare with the relationship between standardized admission test scores and academic achievement in college?
- 3) What is the change in relationship between achievement test scores (ITBS and ITED) and academic achievement in high school and college as the time interval following the time of testing increases?
- 4) What is the difference in the relationship between achievement scores and academic success for sex groups? Is academic attainment more predictable for one sex group than the other? Do any such differences vary as a function of time of assessment?

METHOD

The records of 1,997 graduates of Iowa high schools who entered the University of Iowa as freshmen in the fall of 1977 were secured as part of a validity study in cooperation with the Iowa Testing Programs. The Iowa Testing Programs cooperate with individual school testing programs in the administration of a comprehensive achievement assessment program during the elementary and high school years for most schools throughout the state of Iowa.

The assessment instruments of interest are the two achievement batteries the Iowa Tests of Basic Skills (ITBS) and the Iowa Tests of Educational Development (ITED). The ITBS is a multilevel battery designed to measure achievement in a variety of content areas in grades three through nine. The ITED is a test battery constructed to measure general educational achievement in several content areas in grades nine through twelve. From the college records of the freshmen students, data pertaining to their performance in high school and college were obtained as well as information pertaining to their performance on the ACT. From the records of the Iowa Testing Programs, composite test scores on the ITED and ITBS were obtained for all students whose scores were located in the records.

The variables used in this study were as follows: ITED composite scores for four years of high school, grades 9 to 12; ITBS composite scores for grades 4, 6, and 8; percentile rank in high school graduating class; cumulative high school grade-point average; sex; first semester freshman college grade point average; and ACT composite score. The criterion variables were high school GPA, high school percentile rank, and college freshman GPA.

Zero-order correlations were computed between ITBS composite scores (grades 4, 6, and 8) and a) four-year high school GPA, b) High school percentile rank, and c) first semester freshman college GPA. Similar correlations were computed between ITED composite scores (grades 9-12) and a) four-year high school GPA, b) high school percentile rank, and c) first semester college GPA. Separate correlations were also computed for males and females.

RESULTS AND DISCUSSION

The means, standard deviation, and sample sizes for each variable of interest are presented in Table 1. Of the 1,997 freshmen students the fourth grade records of over 50 percent were located. The differences in the number of scores obtained for students at each grade level were due to the fact that some schools did not test each year and other records could not be traced due to changes in residence during the elementary or high school years.

Insert Table 1 about here

The zero-order correlations of the ITBS composite scores in grades four, six, and eight, and the ITED composite scores in grades nine, ten, eleven, and twelve with four year high school GPA and high school percentile rank are presented in Table 2.

Insert Table 2 about here

The correlations between achievement test scores and four year high school GPA are quite similar across grades. The range of correlations for grade 6 to grade 12 is .49 to .55. The correlation obtained

between fourth grade scores and high school GPA was .42, which is a moderate correlation and is not appreciably lower than the correlations between high school achievement scores and high school GPA.

Due to the nature of the students' records under consideration in this study, there was considerable restriction in the range of scores on the ITBS and ITED: this is probably because those students who were performing at a low level on achievement tests in elementary school and high school would tend not to be represented in a population of college freshmen. Thus the correlations obtained should be regarded as minimum estimates of the predictive relationship between these tests and high school academic performance. Estimates of correlations which could have been obtained for an unselected population can be approximated by statistical methods (McNemar, 1962). When such adjustments for restriction of range are incorporated, the zero-order correlations of ITED composite scores with high school GPA range from .65 to .76. Adjusted correlations for the ITBS composite scores range from .50 to .61.

The zero-order correlations between first semester freshman GPA and relevant composite scores on the ITBS, ITED and ACT are presented in Table 3.

Insert Table 3 about here

The relationships between standardized achievement test scores and first semester college GPA are relatively consistent across the grades considered. The correlations between achievement test scores and college GPA obtained for grade 6 to grade 12 ranges from .44 to

.50. The correlation between ACT composite scores and freshman college GPA was .46. The correlation between grade 4 scores and freshman college GPA was .35. In each set of correlations presented above, the correlation of composite achievement scores with GPA increases as the time between testing and time of attaining the GPA decreases.

The number of students represented in each correlation varied according to the number of records and therefore the number of achievement scores located at each level of interest. The variances of the criterion measures such as high school GPA and college GPA for each subgroup (the group represented at each grade level) were examined. The standard deviations of high school GPA for the subgroups from grade 4 to grade 12 ranged from .44 to .46. The standard deviations of college GPA for the subgroups from grade 4 to grade 12 ranged from .65 to .67. The subgroups were considered to be relatively comparable in their range of criterion measures. It was therefore reasonable to compare the correlations obtained for these subgroups. However, the subgroups were consistently less variable than the total group on these criterion measures (see Table 1). This suggests that the correlations computed for the subgroups and the correlation computed between ACT composite scores and the criterion measure (which was based on the total group of freshman students) were not directly comparable. Therefore correlations between ACT composite scores and college GPA were computed separately for each subgroup and ranged from .46 to .49.

The correlations of ITED and ITBS composite scores with first semester college GPA by sex group are presented in Table 4. The female group showed higher correlations than the male group consistently across grades, although the distributions of composite achievement scores for male students were consistently more variable. There was a tendency

for the differences between correlations to decrease with an increase in the grade in which the scores were obtained.

Insert Table 4 about here

In addition to the zero-order correlations presented, a multiple correlation analysis was performed relating the elementary school and high school achievement composites and freshman college GPA. Composite scores for grades 4, 6, and 8 (ITBS) and grade 11 (ITED) were selected for analysis and yielded a multiple correlation of .48. The use of all four test scores yielded a correlation only slightly higher than that of the grade 11 ITED composite alone with freshman college GPA.

An analysis was also performed to determine the relationship between freshman college GPA and a combination of a school attainment index and achievement test scores ($N = 1018$). Using a combination of high school GPA and the grade 11 ITED composite, a multiple correlation of .65 was obtained. Using high school GPA and ACT composite scores as independent variables and first semester college GPA as the dependent variable, a multiple correlation of .66 was obtained. The high school GPA yielded a zero-order correlation with freshman college GPA of .62.

SUMMARY

The current study supports the contention that proficiency in basic skills at the elementary level as well as the high school level, as measured by the ITBS and ITED, does have a significant relationship to high school and college academic success. The correlations between the measures of achievement under consideration and freshman college GPA were consistently higher for females than males. However, all were

high enough to provide evidence that such achievement scores could be appropriately used to provide information which could aid in decisions pertaining to future academic performance.

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Table 1

Means and Standard Deviations of Variables Obtained
for Iowa Students Entering the University of Iowa in 1977-78

	N	Mean	St. Dev.
College GPA	1917	2.66	.74
High School GPA	1962	3.24	.50
Percentile Rank	1927	73.77	20.41
ACT Composite	1991	23.39	4.48
ITED Composite			
Grade 12	653	25.87	5.23
Grade 11	1053	23.94	4.97
Grade 10	933	21.43	4.66
Grade 9	755	19.30	4.36
ITB ^c Composite			
Grade 8	1221	98.88	12.50
Grade 6	1251	76.81	10.45
Grade 4	1016	54.07	8.89

Table 2

Correlations (r) Between High School GPA,
High School PR and Composite Scores

	High School GPA		High School Percentile Rank	
	r	N	r	N
ACT Composite	.50	1958	.49	1923
ITED Composite				
Grade 12	.53	653	.50	647
Grade 11	.55	1053	.53	1024
Grade 10	.51	931	.49	910
Grade 9	.50	752	.50	732
ITBS Composite				
Grade 8	.49	1215	.50	1186
Grade 6	.49	1246	.47	1216
Grade 4	.42	1012	.40	997

Table 3

Correlations (r) Between College GPA and
Composite Scores

	r	N
ACT Composite	.46	1912
ITED Composite		
Grade 12	.50	631
Grade 11	.48	1019
Grade 10	.56	899
Grade 9	.45	679
ITBS Composite		
Grade 8	.44	1181
Grade 6	.45	1209
Grade 4	.35	976

Table 4

Correlations (r) Between First Semester College GPA

	Male				Female			
	r	N	Mean	St.Dev.	r	N	Mean	St.Dev.
ACT Composite	.43	913	24.12	4.24	.52	999	22.72	4.60
ITED Composite								
Grade 12	.46	339	26.26	5.30	.55	292	25.41	5.08
Grade 11	.43	492	24.09	5.06	.54	527	23.78	4.88
Grade 10	.43	444	21.49	4.68	.50	455	21.37	4.64
Grade 9	.42	356	19.33	4.46	.49	372	19.28	4.27
ITBS Composite								
Grade 8	.40	563	98.59	12.87	.49		99.14	12.15
Grade 6	.39	580	76.59	10.95	.52	629	77.00	9.97
Grade 4	.27	467	53.40	9.34	.43	509	54.70	8.52
College GPA		914	2.60	.77		1034	2.72	.71